## REMARKS/ARGUMENTS

Claims 1-32 remain in the application. Claims 4, 6, 7 and 21-32 were subjected to a restriction requirement by the Examiner and have been withdrawn from consideration by the Examiner. Claim 19 is amended with this amendment to include the aspect ratio limitation found in other pending claims.

New claims 33-44 are added to protect features of the invention not shown by the cited references. No new matter is added with support found at least in paragraphs [0090] and [0096].

After entry of the Amendment, claims 1-3, 5, 8-20, and 33-44 are presented for the Examiner's consideration.

### A. Rejections under 35 U.S.C. 112.

In the October 25, 2005 Office Action, claims 1-3, 5, and 8-20 were rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Examiner asserted that the upper limit of the claimed aspect ratio of less than 1,000,000 does not comply with the written description requirement. This rejection is respectfully traversed based on the following remarks.

As discussed in MPEP 2163.02, the objective standard for determining compliance with the written description requirement is "does the description clearly allow persons of ordinary skill in the art to recognize that he or she invented what is claimed." (citing *In re Gosteli*, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989) Later in this section of the MPEP, the inquiry is described as determining whether an "applicant shows possession of the claimed invention by describing the claimed invention with all of its limitations using such means as words..." In MPEP 2163.03, the typical instance where a problem with the written description requirement may arise is described as being when new claims or limitations are added after the application is filed.

Applicants have fully complied with the written description requirement. First, the upper limit of 1,000,000 for an aspect ratio was provided in the originally filed claims (see, for example, original claim 1). Second, Applicants have showed possession of this claimed feature at least with the "words" and

description provided in the original filing (e.g., no new matter was added to provide the claim description). Specifically, in paragraph [0095], "aspect ratio" is described as "the ratio of the maximum to the minimum dimension of a particle" and in paragraph [0061], the scope of the invention was stated to include nanopowders with an aspect ratio in a range in which "aspect ratio<1,000,000." Hence, Applicants have clearly shown they were in possession of the claimed invention at the time of the filing of the present patent application. Applicants request that the rejection based on the written description requirement be withdrawn.

Further, the MPEP provides further guidance at MPEP 2163.04 where it is stated that the burden is on the Examiner with regard to the written description requirement and a "written description as filed is presumed to be adequate, unless or until sufficient evidence or reasoning to the contrary has been presented by the examiner to rebut the presumption." (citing *In re Marzocchi*, 169 USPQ 367, 370 (CCPA 1971). Further, a general unpredictability of the art is not sufficient to state a prima facie case of lack of written description. For all these reasons, Applicants believe the rejection of claims 1-3, 5, and 8-20 based on 35 U.S.C. 112, first paragraph, be withdrawn.

Also, claims 1-3 and 5 were rejected under 35 U.S.C. 112, first paragraph as failing to comply with the written description requirement. The Examiner requested that Applicants point out the support for the limit "compositional uniform" nanomaterial in the specification. At least paragraphs [0102]-[0103] teach the claimed compositionally uniform product and more specifically chalcogenides claimed in the instant application (e.g., second to last sentence of paragraph [0102]). Applicants, therefore, request that this rejection be withdrawn.

Additionally, in the October 25, 2005 Office Action, claims 1-3, 5, and 8-20 were rejected under 35 U.S.C. 112 as failing to comply with the enablement requirement. Specifically, the Examiner asserted that the upper limit of the claimed aspect ratio of less than 1,000,000 does not comply with the written

description requirement. This rejection is respectfully traversed based on the following remarks.

Applicants believe that they have complied with the enablement requirement and believe that the specification taken as a whole shows one of ordinary skill in the field how to make and use the claimed invention in a manner that would not require undue experimentation. It is believed that the Examiner will reach this same conclusion when examination is performed as discussed MPEP 2164.04 and includes weighing of all the factors provided in MPEP 2164.01(a).

Specifically, in the instant product and composition of matter claims, at least paragraphs [0061], [0090]-[0095], teach the claimed aspect ratios.

At least paragraphs [0102]-[0103] teach the claimed compositionally uniform product and more specifically chalcogenides claimed in the instant application.

At least paragraphs [0096]-[0103] and the incorporated patents teach various embodiments of processes for producing compositions including chalcogenides with solutions, emulsions and with various embodiments of high temperature processes (e.g., teach how to make).

At least examples 8 and 9 demonstrate that certain detailed embodiments of the invention disclosed do indeed enable nanomaterials with an aspect ratio greater than 2. Thus, the application with certain select examples demonstrate enablement.

The specification does not demonstrate with a working example that chalcogenides with an aspect ratio of 1,000,000 were produced prior to the filing of the application. However, case law and MPEP rules state as long as the specification provides considerable direction and guidance on how to practice the claimed invention (such as by related working examples) the enablement requirement is satisfied. With Applicants' specification in hand, it is believed that undue experimentation would not be required for those of ordinary skill. See, for example, MPEP 2164.06(b) which cites *In re Wands*, 8 USPQ 2d 1400 (Fed. Cir.

1988) as a case in which enablement was found (experimentation was required but not undue and likelihood of success if follow inventors' provided guidance).

Applicants also respectfully request the Examiner to consider MPEP 2164.04 at the bottom of page 2100-197, which discusses the desirability for references and need for specific technical reasons to support an enablement rejection. The Examiner is also requested to consider the end of MPEP 2164.04, which urges the Examiner to "always look for enabled, allowable subject matter and communicate to applicant what that subject matter is at the earliest point possible in the prosecution of the application."

It is respectfully requested that the rejections based on lack of enablement be withdrawn.

**B. Rejections under 35 U.S.C. 102(a) or (b) under Schooman article.**

In the Office Action, claims 1-3, 5, and 8-20 were rejected under the Schooman article. This rejection is respectfully traversed.

The ancient Mayan samples mentioned by Schooman review article are acknowledged by Schooman to be the Jose-Yacaman article, which is cited by the Examiner in rejecting claims. The Jose-Yacaman article is fully addressed in Section D below. For reasons stated therein, it is respectfully requested that the rejection based on Schooman be withdrawn.

Similarly, the nonstoichiometric nanomaterials reference cited by Schooman review article is the same as the Chiang et al. article, which is cited by the Examiner in rejecting claims. The Chiang et al. reference is fully addressed in the Section D below. For reasons stated therein, it is respectfully requested that the rejection based on Schooman be withdrawn.

**C. Rejections under 35 U.S.C. 102(b) under Xin et al..**

Claims 1-3, 5, 16, and 18-20 were rejected as being anticipated by Xin et al. This rejection is respectfully traversed.

The Applicants agree that Xin teach chalcogenides *grown on* other chalcogenides. However, this demonstrates that Xin et al. teach CdSe quantum dots that are compositionally non-uniform (CdSe grown on ZnSe). Independent claim 1 limits the claim to compositionally uniform nanomaterial and is, therefore,

distinguished from Xin et al. At least paragraphs [0102]-[0103] teach the claimed compositionally uniform distinction.

It is respectfully requested that the rejection be withdrawn.

**D. <u>Rejections under 35 U.S.C. 102(a) or (b) under various references.</u>**

**1. Claims 1, 3-5, 8, 9, 19 and 20 were rejected under Jose-Yacaman et al.**

Jose-Yacaman et al. show that the ancient Mayan samples comprise neddle like clay compositions (close to $Mg_5(Si,Al)_8O_{20}(OH)_2.8H_2O$ (see at page 224, column 1, last paragraph). Jose-Yacaman et al. suggest using TEM and X-ray analysis such that these palygorskite structures intercalate other compositions such as indigo and approximately spherical metallic nanoparticles (see page 224, column 2 and Figure 4A). In certain samples derived from Palenque, Jose-Yacaman et al. show that faceted metal particles are present (Figures 4 and 5).

However, the Jose-Yacaman discussion shows that none of the compositions comprise chalcogenides. It is respectfully requested that the rejection of all claims with the chalcogenides limitation be withdrawn (including claim 1 and all claims depending from claim 1).

Further, the Jose-Yacaman discussion shows that the ancient samples are compositionally intercalated and non-uniform. It is respectfully requested that the rejection of all claims with compositionally uniform limitation be withdrawn (including claim 1 and all claims depending from claim 1)

Yet further, the Jose-Yacaman discussion shows that the ancient samples comprise approximately spherical particles. Figures 4 and 5 of the cited reference confirm that the aspect ratio is less than 2 in contrast to many of the pending claims. It is respectfully requested that the rejection of all claims with aspect ratio greater than 2 limitation be withdrawn (including independent claims 1, 4, 8, and 19 and claims depending from these claims).

Since claims 1, 3-5, 8, 9, 19 and 20 incorporate one or more of the above limitations, it is respectfully requested that the rejection be withdrawn.

**2. Claims 1, 2, 10, 11, 19 and 20 were rejected under Chiang et al.**

Chiang et al. teach various compositions of cerium oxide and their performance (see at page 7-13). Chiang et al. data suggests that the cerium oxide nanomaterial is spherical (see pages 7-8, and Figure 1).

The Chiang et al. discussion shows that none of the compositions comprise chalcogenides. It is respectfully requested that the rejection of all claims with chalcogenides limitation be withdrawn.

Additionally, the Chiang et al. discussion shows that none of the compositions comprise nanomaterials with aspect ratio greater than 2 or faceted. It is respectfully requested that the rejection of all claims with aspect ratio greater than 2 limitation or faceted morphology limitation be withdrawn.

Chiang et al. do teach nonstoichiometric composition. However, Chiang et al. reference was published in January 1997 and after the earliest priority date of the instant specification. Additionally, Chiang do not teach the other limitations (aspect ratio, shape and morphology limitations) inherent in the dependent claims that also have nonstoichiometric limitation.

Since claims 1, 2, 10, 11, 19 and 20 incorporate one or more of the above limitations, it is respectfully requested that the rejection be withdrawn.

**3. Claims 8 and 9 were rejected under Khabashesku Margrave.**

Khabashesku Margrave was published in 2002 (see attached evidence). The instant application has a priority date in 1996. Thus, Khabashesku Margrave is not available. It is respectfully requested that the rejection be withdrawn.

**4. Claims 8, 9 were rejected under Kian Ping Loh et al.**

Kian Ping Loh was published on February 21, 2004 (see at Page 1, *Chemical Physics Letter*). The instant application has a priority date before this publication date. Thus, Kian Ping Loh is not available under 35 U.S.C. 102. It is respectfully requested that the rejection be withdrawn.

**5. Claims 12 and 13 were rejected under Lee and Chen.**

Lee and Chen was published on October 27, 2000 (see attached evidence). The instant application has a priority date before this publication date. Thus, Lee and Chen is not available as a reference under 35 U.S.C 102. It is respectfully requested that the rejection be withdrawn.

**6. Claims 16-20 were rejected under Kian Ping Loh et al.**

Kian Ping Loh was published on February 21 2004 (see at Page 1, *Chemical Physics Letter*). The instant application has a priority date in 1996. Thus, Kian Ping Loh is not available as a reference against the pending claims. It is respectfully requested that the rejection be withdrawn.

**E. Conclusion.**

In view of all of the above, the claims are believed to be allowable and the case in condition for allowance which action is respectfully requested.

No fee is believed to be required by this response. Any fee deficiency associated with this submittal may be charged to Deposit Account No. 50-1123.

Respectfully submitted,

April 21, 2006

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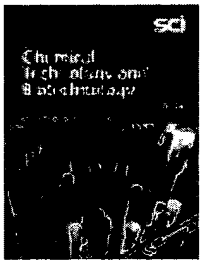
# APPENDIX



Journal of Chemical Technology & Biotechnology
Volume 75, Issue 11 , Pages 1073 - 1079
Published Online: 27 Oct 2000


## Research Article

### Catalytic properties of Ni-B and Ni-P ultrafine materials

Shao-Pai Lee, Yu-Wen Chen *

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*Correspondence to Yu-Wen Chen, Department of Chemical Engineering, National Central University, Chungli 32504, Chinese Taipei

**Funded by:**

- National Science Council of the Republic of China; Grant Number: NSC-88-2214-E-008-008

**Keywords**

Ni-P; Ni-B; nitrobenzene hydrogenation; nanomaterial

**Abstract**

The ultrafine Ni-B and Ni-P amorphous alloy catalysts were prepared by the chemical reduction method. The catalysts were characterized with respect to ICP-AES, XRD, nitrogen sorption, DSC, SEM, TEM and XPS. Nitrobenzene hydrogenation was used to compare their hydrogenation abilities. The different metalloids of boron and phosphorus bound to the nickel metal for the Ni-B and Ni-P catalysts result in the distinct different surface area, amorphous structure and hydrogenation activity of the catalysts. Ni-B had a larger surface area than Ni-P. The specific activity per surface area of Ni-P was greater than that of Ni-B. The different activities between the Ni-P and Ni-B can be attributed to the difference of the electron density on the nickel metal; boron donates electrons to the nickel metal and phosphorus accepts electrons from the nickel metal. The catalysts were easier to oxidize when they were exposed to air. This would result in the lower activity. However, the activity could be recovered in the reaction process due to the presence of hydrogen in the reaction system.

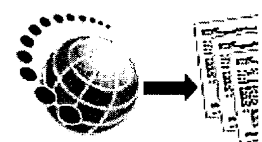


Received: 23 July 1999; Revised: 17 March 2000; Accepted: 5 July 2000

**Digital Object Identifier (DOI)**

10.1002/1097-4660(200011)75:11<1073::AID-JCTB316>3.0.CO;2-L About DOI







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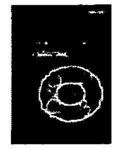

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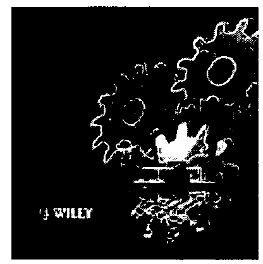


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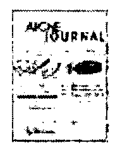

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## Advanced Engineering Materials

**No. 9, 2002**

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Contents: Adv. Eng. Mater. 9/2002

**Abstract**

No abstract.

*Adv. Eng. Mater.* 2002, **4**, (No.9) *643-646*

**F.A. Mohamed***

Creep Behavior of Powder Metallurgy SiC-Al Composites

**Abstract**

The creep properties of powder metallurgy (PM) discontinuous SiC-Al alloys (whisker and particulate) and their Al matrices have been the subject of many studies recently that have aimed not only at assessing the potential of the PM SiC-Al alloys for use as high temperature materials but also at identifying the origin creep strengthening in such materials. As a result of these studies, several sets of experimental results are now available. This paper reviews some of the results. Emphasis is placed on the identification of issues related to early work and on efforts made recently to clarify them. In addition, recent developments regarding the roles played by SiC particulates and the Al alloy matrix during the creep of a PM SiC-Al composite are discussed.

/ creep beavior / metal matrix composites / powder metallurgy /

*Adv. Eng. Mater.* 2002, **4**, (No.9) *651-657*

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**E. Schüller,* R. Vaßen, D. Stöver**
Thin Electrolyte Layers for SOFC via Wet Powder Spraying (WPS)
**Abstract**
The potential of the wet powder spraying (WPS) process for the depositon of thin dense films for solid oxide fuel cell electrolytes is demonstrated. In contrast to many other production methods the process allows high deposition rates. Economical aspects such as good up-scaling, low investment costs for the equipment and short sintering times for the layers make the WPS process an interesting alternative to other deposition techniques.
/ fuel cells / SOFC / thin electrolyte layers / wet powder spraying / Yttrium stabilized zirconia /
*Adv. Eng. Mater.* 2002, **4**, (No.9) *659-662*

**D. Bourell,* M. Wohlert, N. Harlan, S. Das, J. Beaman**
Powder Densification Maps in Selective Laser Sintering
**Abstract**
Selective Laser Sintering (SLS) is a manufacturing process in which a part is produced without the need for part-specific tooling. It competes effectively with other manufacturing processes when part geometry is complex and the production run is not large. Traditionally, this was limited to prototype production, although tooling applications are now appearing. This paper describes several applications of powder densification maps to advance solutions in direct SLS of metallic and ceramic powders. Time-dependent plasticity issues arise in pre-processing of powder to make it suitable for SLS and in post-processing of SLS parts to obtain desired density.
/ densification maps / rapid prototyping / selective laser sintering / solid freeform fabrication / time-dependent plasticity /
*Adv. Eng. Mater.* 2002, **4**, (No.9) *663-669*

**V.N. Khabashesku,* J.L. Margrave**
Carbonitride Nanomaterials, Thin Films, and Solids
**Abstract**

Binary, ternary, and quaternary carbonitride materials, such as $CN_x$, BCN, SiCN, SiBCN, AlBCN, are of significant industrial interest because of their light weight and multi-functional properties, combining extreme hardness, oxidation resistance, and chemical inertness. The most exciting material in this family is carbon nitride $C_3N_4$ with expected 'superdiamond' properties. This report describes new approaches to the preparation of $CN_x$ thin

films, and nanoscale or bulk solids of $C_3N_4$ and BCN.
/ carbon nitrides / nanomaterials / thin films /
*Adv. Eng. Mater.* 2002, **4**, (No.9) *671-675*

**J. Freudenberger,* W. Grünberger, E. Botcharova, A. Gaganov, L. Schultz**
Mechanical properties of Cu-based Micro- and Macrocomposites
**Abstract**
There is a need for high-strength and highly-conducting materials for applications such as pulsed high magnetic field coils. Two different approaches were studied in order to strengthen copper-based conductor materials. On the one hand, microcomposite Cu-Ag alloys yield high strength as a consequence of their nanoscale microstructure and, on the other hand, a Cu-based macrocomposite can be strengthened by the use of a steel jacket. In both cases the increase of strength coincides with a decrease of conductivity. Thus, the ideal material balances between these two competing properties.
/ conductor materials / copper macrocomposites / copper microcomposites / ultimate tensile strength / work hardening /
*Adv. Eng. Mater.* 2002, **4**, (No.9) *677-681*

**Y. Xu,* K. Otsuka, H. Yoshida, H. Nagai, R. Oishi, H. Horikawa, T. Kishi**
A New Method for Fabricating SMA Smart Polymer Matrix Composites
**Abstract**
No abstract.
/ hybrid materials / polymer matrix composites / shape memory alloys /
*Adv. Eng. Mater.* 2002, **4**, (No.9) *683-686*

**W.X. Chen,* J.P. Tu,* Z.D. Xu, R. Tenne,* R. Rosenstveig, W.L. Chen, H.Y. Gan**
Wear and Friction of Ni-P Electroless Composite Coating Including Inorganic Fullerene-$WS_2$ Nanoparticles
**Abstract**
No abstract.
/ electroless composite coating / fullerenes / layered compounds / nanoparticles /
*Adv. Eng. Mater.* 2002, **4**, (No.9) *686-690*

**B. Ferrari,* A.J. Sánchez-Herencia, R. Moreno***
Porous Nickel Coatings on Steel Tubes Formed by Aqueous Colloidal Processing
**Abstract**

No abstract.
/ aqueous colloidal processing / nanostructured coatings / porous Nickel / steel tubes /
*Adv. Eng. Mater.* 2002, **4**, (No.9) *690-694*

**J. Alkemper, R. Mendoza, P.W. Voorhees***
Morphological Evolution of Dendritic Microstructures
**Abstract**
No abstract.
/ dendritic microstructures / morphological evolution / solidification /
*Adv. Eng. Mater.* 2002, **4**, (No.9) *694-697*

**W. Zhang, M. Sui,* Y. Zhou, Y. Zhong, D. Li**
Orientated Nanometer-Sized Fragmentation of TiC Particles by Electropulsing
**Abstract**
No abstract.
/ electropulsing / mesoporous materials / nanostructured materials / sol-gel process / spray drying / titanium carbides /
*Adv. Eng. Mater.* 2002, **4**, (No.9) *697-700*

**J.B. Bai,* J.-L. Vignes, T. Fournier, D. Michel**
A Novel Method for Preparing Preforms of Porous Alumina and Carbon Nanotubes by CVD
**Abstract**
No abstract.
/ carbon nanotubes / chemical vapor deposition / porous alumina / preforms /
*Adv. Eng. Mater.* 2002, **4**, (No.9) *701-703*

Print-Version